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Observations on the Habits of the Ornate Box Turtle, *Terrapene ornata* (Agassiz)

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During the summer of 1948 the authors carried on herpetological field work in Socorro County, New Mexico. The ornate box turtle, *Terrapene ornata*, was found to be a common inhabitant of the northern portion of the Jornada del Muerto, an elongate plain which reaches its northern limit in eastern Socorro County. The northern end of the Jornada lies at an elevation of about 4,500 feet. Many of our observations were recorded along the paved highway (U. S. 380) which cuts across the plain in this region. Here the Jornada is essentially level and is about 17 miles in width, sloping up gradually to the abrupt foot of the Sierra Oscura on the east and to a range of low dissected foothills on the west.

Climatically, the Jornada del Muerto is allied to the Chihuahuan desert both by its aridity and by its summer rainfall. Average annual precipitation at the Jornada Experimental Range, Dona Ana County, for a 22 year period was 9.33 inches (Hardy, 1941). Over half (4.91 inches) of this total fell during the months of July, August, and September. Annual temperature fluctuations are wide. Over the same 22 year period the maximum temperature recorded was 109° F. (42.8° C.) while the minimum was — 7° F. (21.8° C.). There is often some snowfall on the Jornada during the winter months.

Turtles were common both on the level lowlands of the Jornada and on the gullied, gravelly foothill slopes along its edges. The animals were found in a variety of plant associations, the principal elements of which were creosote bush (*Larrea divericata*), yucca (*Yucca data*), mesquite (*Prosopis juli flora*) juniper (*Juniperus monospermum*), tarbush (*Flourensia cernua*), and grasses. In general, the turtles show little preference of soil type. They were observed on deposits of pure aeolian sand, red clay, silts, and on the gravelly soils of

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the bajadas. They were not taken from the higher foothill slopes where the substratum is one of pebbles, rocks, and boulders. Probably construction of hibernating dens is impossible in such an area.

The surface activity of *T. ornata* seems to be in large part controlled by rainfall. Four crossings of the Jornada were made during or shortly after thunder-showers in July and August. An average of 11 turtles (alive and fresh DOR) were noted on each of the crossings in the 16 miles between Carthage store and Bingham P. O. Turtles were conspicuously absent when a day or two went by without rainfall.

Charles H. Lowe, Jr. found *T. ornata* swimming in a muddy pond 4.2 miles west of Ima, Guadalupe County, New Mexico, at about 11:00 A. M. on August 13, 1949. In his field notes he states:

"I observed an adult box turtle resting two feet from the water's edge on the slightly sloping muddy bank of a rectangular pond about 160 feet in length and 75 feet wide. The turtle became alarmed and quickly entered the water, diving under to reappear about 10 feet from the edge. Further observation revealed the presence of at least 8 or 9 other turtles in the pond, but the muddy opacity of the water prevented an exact count. All sizes from juveniles to fully grown adults were present. I was surprised to note the agility with which they swim. They were seen to float with the head and upper part of the carapace out of the water. The surrounding habitat was mainly juniper and grass. Many leopard frogs (*Rana pipiens*) were seen in the pool and a small great plains toad (*Bufo cog-*

flatus) was taken on the bank."

The turtles seem to be active through a wide range of temperatures. An adult, observed during a thunder-shower, was wading about in a temporary rain pool, the temperature of which was 19° C. Other adults were observed walking or resting on the highway during a rain-storm at an air temperature of 20° C. An adult was found resting beneath a creosote bush where the air temperature was 32.6° C. and the soil surface 29.6° C. Temperatures recorded for an adult found in a self-made hollow at the base of a *Yucca elata* bush were: air, 28° C. and soil surface, 26° C. A juvenile walking slowly across an open space between creosote bushes had a cloacal temperature of 30.2° C. Attempts to obtain cloacal temperatures of adult *Terrapene* proved futile, as the plastron was invariably closed when the animal was disturbed. The juvenile individual proved more vulnerable to our methods, however, as it was unable, at such an early age, to close its plastron.

No evidence for nocturnal activity was obtained. Much night driving, which yielded such nocturnal snakes as *Hypsiglena*, *Arizona*, *Rhinocheilus*, and *Leptotyphlops*, failed to produce a living *Terrapene*. All of the living turtles were found active either during the daylight hours or just at dusk.

A number of *Terrapene* were kept alive in a 12 foot square concrete tank at Socorro. Water was poured into the sloping bottom of the tank so that

about half of the bottom was covered by a shallow pool. Various retreats were provided on the dry half to protect the animals from the sun. The turtles fed, somewhat reluctantly, upon the fruit of the coyote melon (*Cucurbita foetidissima*) but quickly devoured a freshly killed collared lizard (*Crotaphytus collaris*). Similarly, a turtle was seen on Highway 380 feeding upon the remains of a DOR *Terrapene*. Living *Scaphiopus* tadpoles in various stages of development were introduced into the pond and the turtles spent much time capturing and eating them. They displayed surprising agility in capturing these larvae. Both living and dead tadpoles were taken. These observations, coupled with the observed amphibious tendencies of *Terrapene*, suggest that the box turtle may be an important predator upon *Scaphiopus* larvae. Also the fact that the two occur together over a wide portion of their ranges tends to support this view. The emergence of both *Terrapene* and *Scaphiopus* is controlled by the same factor, rainfall, though of course the larvae of *Scaphiopus* are present during their period of growth as long as the water in the temporary breeding pools lasts. Metamorphosed *Scaphiopus* are not acceptable as food for box turtles. A captive young adult turtle pursued and captured a newly transformed *S. hammondi*, but after a few bites the turtle relinquished its prey and repeatedly wiped its snout with its forefeet in obvious distaste. The noxious secretion of the spadefoot toad did not save its life but under natural conditions the toad might not have been attacked. A larger toad might be able to survive such an attack. The box turtle seems to be omnivorous and probably serves as a rather effective scavenger.

The slow-moving, conspicuous *Terrapene* might seem to be "at the mercy" of predators such as coyotes and foxes. However, they show several defensive mechanisms which must be quite effective, judging from the large number of adult turtles on the Jornada. The obvious protection of retreat into the bony carapace and plastron and the closure of the hinged portions of the plastron seems inadequate. Snapping jaws serve as protection against a predator prying the front of the plastron open but the rear portion has no such protection. Instead, copious quantities of concentrated, highly pungent urine are released when the animal is disturbed. This defense has been noted in the desert tortoise (Woodbury and Hardy, 1948; Pope, 1939) and in other terrestrial turtles. Thinness of the shell and inability to close the plastron make the juvenile box turtle extremely vulnerable. Of the 70 turtles noted during our observations, only one was a juvenile. It is possible that these small animals compensate for their vulnerability by secretiveness.

During the winter, when freezing temperatures are common on the Jornada, the turtles must occupy refuges, probably in subterranean burrows of sufficient depth that habitable temperatures are constantly maintained.

What was probably such a burrow was observed by Charles H. Lowe, Jr. while engaged in field work several miles northwest of Mockingbird Gap on the Jornada on August 21, 1947.

"Investigation of numerous criss-crossing *Terrapene* tracks around what I had at first taken to be a large *Dipodomys spectabilis* mound led to the discovery of a large adult female *Terrapene* sitting in the mouth of a burrow. A half grown male was sitting on top of the mound in the shade of a *Larrea* bush. Two more turtles were visible well inside other burrows in the mound. The holes were considerably larger than those usually observed at *D. spectabilis* colonies and lacked the characteristic semicircular arch of *Gopherus agassizi* tunnels" (field notes).

During the months of surface activity the turtles usually find refuge from the midday heat by resting in shallow excavations under bushes or merely by resting in the shade. The most extensive of these temporary refuges just covered the animal's body.

On August 12, 1948 at 11:30 A. M. we noticed two of the captive *Terrapene* in copulation. The female was sitting quietly with the male behind her in an inverted position resting upon the posterior portion of his carapace. The posterior portion of his plastron was touching the marginal scutes of her carapace. The male's tail was curled under that of the female. His hind legs grasped her carapace along the posterior marginals just in front of her hind legs, thus locking them together. After half an hour, during which the male made copulatory movements by flexing his legs and moving his tail, the female began to walk off, dragging the inverted male after her. In spite of being bumped over the ground the male maintained his hold and continued rhythmic movements. Copulation ceased after two hours. Two minutes after the male removed his copulatory organ he released his grip and righted himself. A similar mating was recorded by Cahn and Conder (1932) for *Terrapene carolina*. A photograph and drawing of the mating posture are presented there.

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